Space Weather Technical Forecast

Issued on Thursday 6 March 2025 at 12:03 Local

This technical forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

---

Space Weather Forecast Headline: Chance of M-class flares (R1-R2; Minor-Moderate radio blackouts) throughout. G1/G2 likely Days 3/4.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity reached Moderate levels just prior to this period, following an isolated, impulsive M1.7 at 05/1150UTC from AR4016, located in the southeast quadrant. Otherwise, activity has been Low with occasional low level C-class activity in the past 24 hours.

There are currently nine sunspot regions on the visible solar disc. AR4012 in the southeast quadrant is the largest region but has not produced any significant flares recently. AR4007, the second largest region nearing the southwest limb, is a relatively simple bi-polar group. AR4016 in the southeast has shown further slight recent growth and has a potentially more complex magnetic structure despite its relatively small size, it also produced the only notable flare of the period, mentioned above. Remaining spot regions are small and magnetically simple.

No Earth-directed Coronal Mass Ejections (CMEs) were identified in available coronagraph imagery.

Solar Wind / Geomagnetic Activity: Solar winds, as measured by ACE at L1, were between 450-380km/s. Solar wind density was below Average. The Interplanetary Magnetic Field was Weak, and the north-south component was Weak and variable, between +7/-6nT. The phi angle was largely positive (away from the Sun), with brief incursions to neutral or negative (towards the Sun). Geomagnetic activity was Quiet (Kp 1-2), as observed by BGS.

Energetic Particles / Solar Radiation: High energy proton flux (greater than 10MeV) at GOES18 was at Background.

High energy electron flux saw a rise in its diurnal oscillation, reaching Moderate levels of 631pfu at 05/1635UTC. The 24-hour fluence was below the Active threshold (1e8 integrated pfu), on a declining trend, recording 1.32e7 integrated pfu at 05/2359UTC.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to be generally Low, with a chance of further isolated M-class flares.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 370 900 0100 Email: enquiries@metoffice.gov.uk

© Crown Copyright 2025. All Rights Reserved.

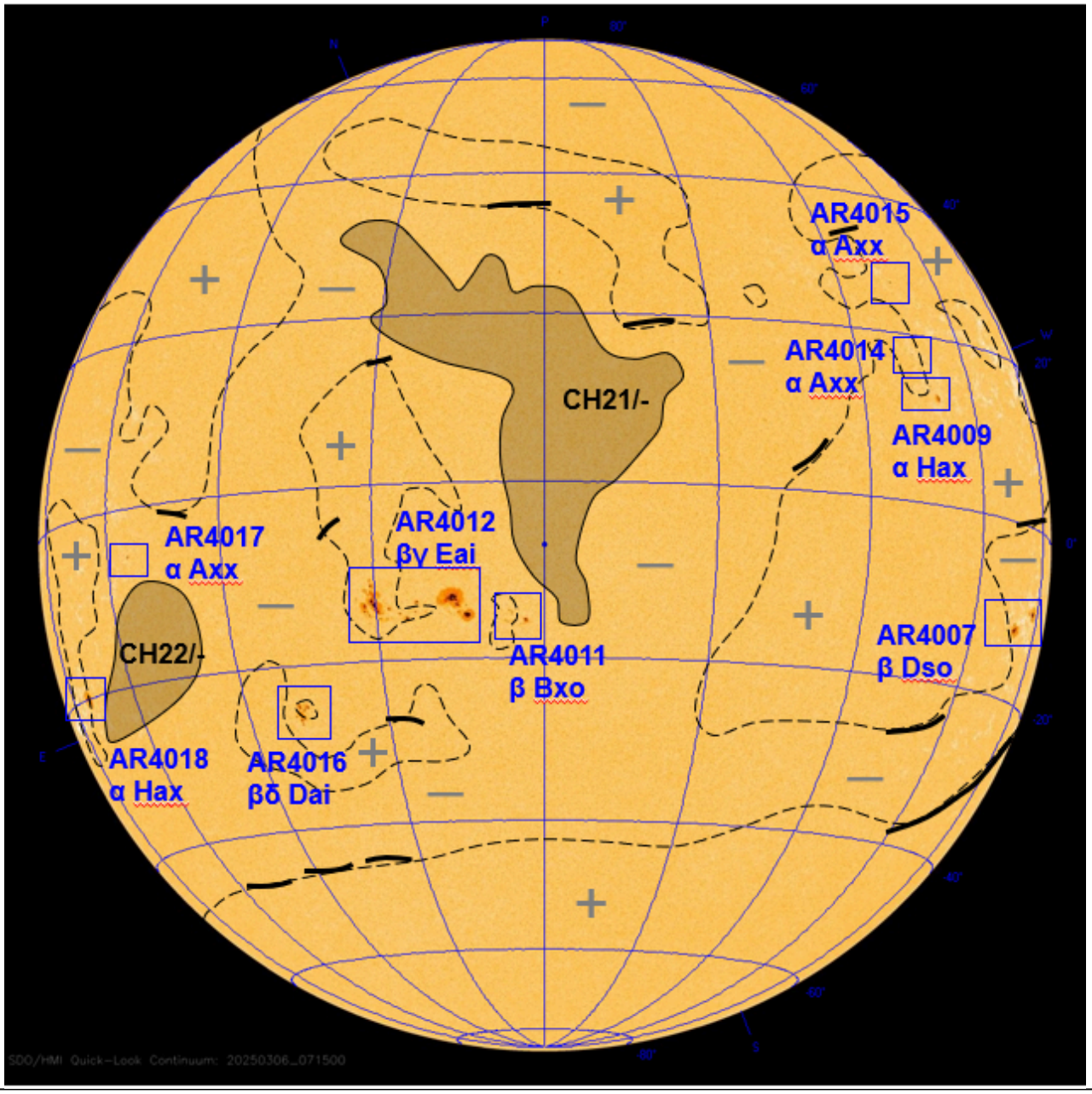
Solar Wind / Geomagnetic Activity: There are currently no Earth-directed CMEs in the forecast. Slightly Elevated winds are expected to continue declining towards Background at first. During Day 3 (8 March) Earth is likely to connect with the High Speed Stream from CH21/-. Solar wind speeds are expected to increase to Elevated to Strong. Geomagnetic activity is expected to be Quiet to Unsettled (Kp1-3) on Days 1 and 2 (6/7 March). However, on day 3 (8 March) and during Day 4 (9 March) periods of Active to G1/minor geomagnetic storm (Kp 4-5) are likely with a chance of isolated G2/Moderate geomagnetic storms (Kp 6).

Energetic Particles / Solar Radiation: High energy proton flux should remain at Background levels. High energy electron flux is likely to remain background to Moderate. The associated 24 hour fluence is expected to remain below the Active threshold.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 370 900 0100 Email: enquiries@metoffice.gov.uk

© Crown Copyright 2025. All Rights Reserved.

Figure 1: Solar Synoptic Analysis 06/0730UTC



Key: Filament ___ , Prominence ___ , Magnetic Field Line - - - , Polarity +/-, Coronal Holes: Grey shaded area CHxx +/-, Sunspot groups 25xx - Mt Wilson α-β-βγ-βγδ and Zurich-McIntosh Axx etc.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 370 900 0100 Email: enquiries@metoffice.gov.uk

© Crown Copyright 2025. All Rights Reserved.

Geomagnetic Storms

There are currently no Earth-directed CMEs in the forecast.

Slightly Elevated winds should decline towards Background over coming Days 1 and 2 (6/7 March). On Day 3 (8 March) Earth is expected to connect with the High Speed Stream from coronal hole 21/-. Elevated to Strong wind speeds are expected, this is supported by 27 day persistence and MOSWOC Enlil.

Geomagnetic activity is expected to be Quiet to Unsettled (Kp 1-3) on Days 1 and 2. However, on Day 3 (8 March), geomagnetic activity is expected to increase due to connection with CH21/-. Given that we are approaching the vernal equinox and G1/minor storm level was observed on the previous rotation, periods of Active to G1/minor geomagnetic storm (Kp 4-5) are likely, with a chance of isolated G2/Moderate geomagnetic storm (Kp6) later on day 3 or during Day 4 (8/9 March).

Geomagnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	**G1 to G2**	No	1	1	60	60
Strong	**G3**	No	1	1	10	10
Severe	**G4**	No	1	1	1	1
Extreme	**G5**	No	1	1	1	1

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 370 900 0100 Email: enquiries@metoffice.gov.uk

© Crown Copyright 2025. All Rights Reserved.

Radio Blackouts - X-Ray Flares

There are currently nine sunspot regions on the visible solar disc. AR4012 in the southeast quadrant is the largest region but has not produced any significant flares recently. AR4007, the second largest region nearing the southwest limb, is a relatively simple bi-polar group. AR4016 in the southeast has shown further slight recent growth and has a potentially more complex magnetic structure despite its relatively small size, it also produced the only notable recent flare just prior to the start of this period, an impulsive M1 flare at 05/1150UTC. Remaining spot regions are small and magnetically simple.

Solar activity is expected to be generally Low, with a chance of further isolated M-class flares. The main risk from AR4012 and AR4016 in the southeast.

X-Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 (M Class)	No	45	45	45	45
Very Active	R3-R5 (X Class)	No	5	5	5	5

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 370 900 0100 Email: enquiries@metoffice.gov.uk

© Crown Copyright 2025. All Rights Reserved.

Solar Radiation Storms (High Energy Protons)

GOES18 high energy (>10MeV) proton flux is at Background, and expected to remain at this level. There is a Slight Chance of enhancement to S1 given any significant eruption from the sunspot regions currently on the Earth-facing disc.

Radiation Storms Probability (Exceedance)	Level ($cm^{-2}sr^{-1}s^{-1}$)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	5	5	5	5
Very Active	**≥ S3 ***	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and/or 50 MeV ≥ 10pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 370 900 0100 Email: enquiries@metoffice.gov.uk

© Crown Copyright 2025. All Rights Reserved.

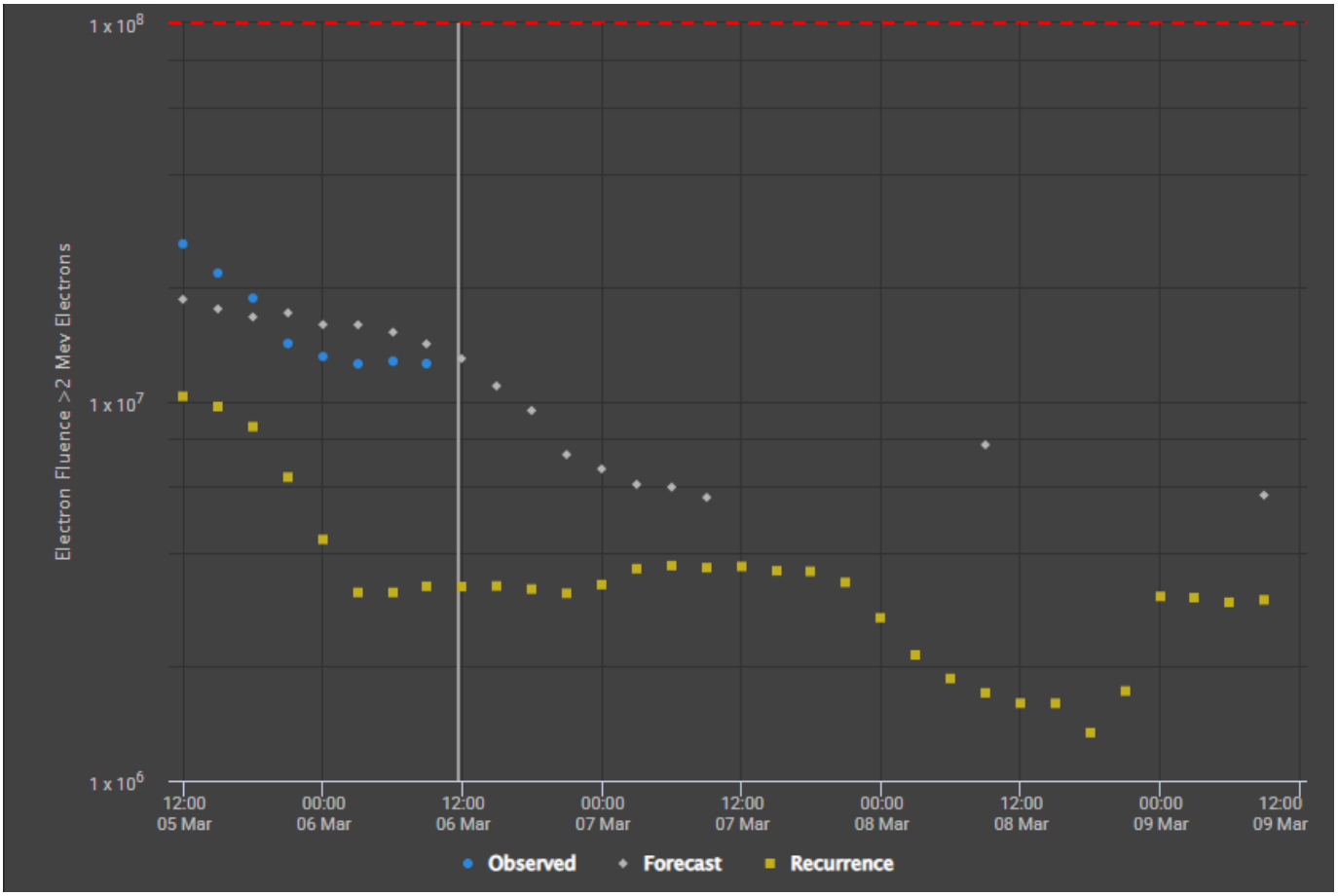
High Energy Electrons (≥ 2MeV)

The high-energy electron flux (>2MeV), as observed at GOES16, has been Normal Background to Moderate which is expected to continue. No further enhancements are forecast.

The associated 24-hour fluence is declining and is likely to remain below Active as indicated by MOSWOC REFM guidance output.

GEO Electron Environment	Level ($cm^{-2}sr^{-1}$ day^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ 2 MeV ≥ 1×10^{8}	No	1	1	1	1
Very Active	≥ 2 MeV ≥ 1×10^{9}	No	1	1	1	1

Figure 2: MOSWOC REF Model



Issued by Met Office Space Weather Advisor, Tel: +44 (0) 370 900 0100 Email: enquiries@metoffice.gov.uk

© Crown Copyright 2025. All Rights Reserved.